Land Use Planning for the 21st Century

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EXECUTIVE SUMMARY

Government has become increasingly involved in private land use decisions. Dissatisfaction with current land use planning and policies has produced proposals to combat urban sprawl by promoting sustainable development and "smart growth" initiatives. This study examines current issues and policies and provides suggestions that would improve the efficiency of land use.

- Protection of the environment is an important goal, but often analysis confounds two separate issues. One is the protection of valuable environmental amenities, which should be done by government purchase, or by other methods that compensate landowners for protecting these resources. A second issue is the consumption of open space through development. Developed areas constitute about five percent of total U.S. land area, and development is not proceeding at such a rapid rate as to threaten open space in general. Thus, there is no need to promote higher-density development to protect open space.

- Development is sometimes opposed because it consumes farmland, but the facts show that farmland is not threatened by development, and that decreases in farm acreage are due to increased productivity in farming, not real estate development.

- One of the major concerns about sprawling development is traffic congestion. Despite problems in some areas, average commuting times are stable, and the quickest method of commuting is via single-occupancy automobile. Except in a few densely populated areas, mass transit does not have much potential to alleviate traffic congestion. One factor that has increased congestion is a substantial decline in expenditures for highway construction since 1970.

- "Smart growth" advocates propose increasing population densities in urban areas and limiting development outside of the urban core. However, the analysis of this paper shows that

higher density development leads to higher construction costs, more expensive government, greater traffic congestion, less affordable housing, and more extensive damage to the environment.

- Optimal land use patterns are determined by the location of transportation corridors. Thus, in the automobile age, effective land use policy begins with a public policy that locates major roadways well before the capacity is needed.

- In the past, land use policy revolved around government mandates. A more effective land use policy would entail less public planning for the ways that private landowners can use their land, but more advance government planning on the development of the government's own resources, especially roads.

- Once the issues are analyzed, it is apparent that land use policy is a local issue best handled by local governments, perhaps with state government assistance. There is no justification for expanding the federal government's role in land use planning.

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INTRODUCTION

Prior to the 20th century, land use decisions in the United States were made almost entirely by private landowners. Government had considerable involvement because it had substantial land holdings, but its largest impact was through its transfer of government land into private hands (e.g. by land grants to railroads and by opening up government land to homesteading). In the 20th century, government played a much larger role in land use policy. At the local level, where most land use policies are made, zoning laws, first applied in New York City in 1916,[1] have regulated land use patterns. In the last quarter of the 20th century, state governments began designing policies to try to control urban and suburban development. The federal government has also had a substantial impact in many ways, ranging from designating land as national parks, creating environmental regulations affecting land use, and the creation of the interstate highway system that has had a major impact on land use patterns. The United States, founded on the principle of safeguarding individual liberty, has always given private landowners wide latitude in the way that they can use their property, but increasingly there has been a call for more government involvement in land use decisions. There are a number of complex and interrelated issues and concerns related to land use decisions, and the purpose of this study is to evaluate those issues to see what their implications are for government land use policy.

The land use issues considered in this study revolve around the development of real estate in urban and suburban areas for residential and commercial purposes. Real estate development patterns have changed significantly in the last half of the 20th century, raising a number of issues, including the impact of development patterns on the environment, the loss of farmland converted to residential and commercial use, increased traffic congestion, and inefficient development patterns that impose social costs for private benefit. The phrase that has been associated with

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[1] Richard F. Babcock, *The Zoning Game* (Madison: University of Wisconsin Press, 1966), p. 5.

this new type of development is "urban sprawl," and the response to urban sprawl has been to call for policies to promote "sustainable development," or "smart growth." This study will examine several of the major issues underlying the concerns about sprawling growth, and discuss the policy responses to those issues that have emerged. With the benefit of past experience in growth management, the study will then discuss land use planning methods that show promise for the 21st century.

The analysis in this study shows that many concerns raised about current trends in land use are unwarranted, and that common responses to them are often counter-productive. The facts show there is no reason to be concerned that development is consuming undeveloped land, because the total amount of developed land remains small. Furthermore, policies that try to limit development often reduce the quality of life. Development patterns that are often considered as indicators of undesirable sprawl, such as leapfrog development and strip or ribbon development, typically result in efficient development patterns when government effectively plans its future infrastructure. When governments move to restrict these types of development, government policy often works against the public interest to create more inefficient land use patterns and more traffic congestion.

Many proponents of "smart growth" argue for policies that produce higher population densities to counteract urban sprawl, but this analysis shows that higher densities are more costly, are potentially more harmful to the environment, exacerbate traffic congestion, and can lower the quality of life. High-density development is warranted where, because of high land prices, market incentives produce it, but government policies designed to increase population density have the effect of raising costs and reducing the standard of living. An analysis of land use development patterns shows that market incentives lead to efficient land use decisions without government interference; however, for efficient development, developers must know where future transportation corridors will be located. This implies that government should undertake less planning for how private landowners can use their

property, but do more planning for its own future infrastructure, especially roads.

This analysis shows that the impact of land use decisions are almost always local in nature, implying that local governments are the level of government that should deal with the issues. In some cases the impacts may spill over beyond local government boundaries, implying a minimal role for state involvement, but by the nature of the issues, there is no reason for the federal government to become involved in land use planning. Having alerted the reader that this study's conclusions are at odds with many commonly-held views on land use and development patterns, the next section examines some of these issues in more detail to show why these conclusions are warranted.

1. ISSUES

The proponents of "smart growth" alternatives to sprawling development cite a number of problems that come with urban sprawl. The issues discussed here are not covered because they are the most important; rather, they are chosen because they have surfaced as major issues in the policy debate and it is important to put them in context. When issues are mis-characterized in the policy debate, they can lead to ineffective or even counterproductive policies, and after some analysis of the issues, this study shows that 20th century policy responses have often been counterproductive. One of the major issues is environmental preservation. This issue is important, but it has often been mis-characterized in the policy debate on land use planning. Closely related is the issue of farmland preservation. After analyzing the issue, farmland preservation is shown to be completely irrelevant to the "smart growth" debate. Traffic congestion is a more immediate concern for people who are living in growing areas, and is perhaps the most visible indicator of problems related to sprawling growth. All of these issues, in turn, are related to development patterns. These issues will be considered along with a discussion of the costs of high-density development to provide a background for analyzing growth management policies.

Advocates of "smart growth" want to manage development to counteract two trends that have characterized 20th century development patterns: declining population density and increased reliance on automobile transportation. These two trends have been produced by two related factors: increased wealth and the increased availability of private automobiles as a transportation option. Once these causes of lower density development are recognized, it becomes apparent that the trend will be difficult to counteract. As people become wealthier, they want to buy more space, and more transportation flexibility. Thus, population density falls as a result of choices people make to enhance their quality of life. In the Lower East Side of New York City population density peaked at about 350,000 per square mile in the first decade of the 20th century (perhaps the highest population density anywhere, ever), and has continually declined since. At the beginning of the 21st century, the

population density in New York City is about 23,000 per square mile. Population density has declined in almost all big cities around the world, including Chicago, London, and Paris, and one can expect that as the world becomes wealthier, people will continue to choose to buy more space and more travel flexibility with their money.[2] Thus, "smart growth" advocates who want to produce higher population densities and reduced reliance on automobile travel are working against market forces and the lifestyle choices of residents.

I. Environmental Preservation

Preservation of environmental amenities is a widely held goal. The debate on environmental preservation is not about whether it should be done, but rather what policies are most likely to be successful. The issues can be divided into two main categories. First, development can damage some specific environmental amenities; second, sprawling development in general has been criticized because it consumes too much open space, converting undeveloped land and farmland into residential and commercial use. The issues are related, but separate. Growth policies aimed at protecting the environment must analyze these two issues separately.

If environmental amenities are so valuable that it is in the public interest to permanently preserve them, then appropriate public policy is to prevent development either by having the government purchase the land, or to otherwise compensate the landowner for preserving the environment for the public good.[3] The issue of regulatory takings

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[2] These issues are discussed further in Robert Bruegmann, "The Pursuit of Density," in Randall G. Holcombe and Samuel R. Staley, eds., *Smarter Growth: Market-Based Strategies of Land Use Planning in the 21st Century* (Westport, CT: Greenwood, forthcoming).

[3] Sometimes public policy is not necessary. Private owners of environmental amenities often take it upon themselves to protect the environment, but if public policy is to be used, then government purchase or compensation to the owner for environmental preservation is appropriate.

has been discussed at length,[4] but is peripheral to the issues considered here. The main issue in the urban sprawl debate and the push for "smart growth" is not the protection of specific amenities, a point on which there is widespread agreement, but the idea that land development should be discouraged because it is consuming farmland and undeveloped land. On this issue there is little reason for concern, because there is so much undeveloped land remaining.

Table 1 presents some data on land use in the United States. As the table shows, more than one-third of the total land in the United States is government-owned. In 1990 the federal government owned 28.6 percent of the total U.S. land area, and state and local governments owned 7.1 percent of total land area. While federal ownership has been declining over the decades, state and local land ownership has been increasing, and state and local governments owned nearly 34 percent more land in 1990 than in 1960. When compared to the total amount of developed land in the nation (shown in the bottom row), government owns about ten times as much land as the total amount of land that is developed. Furthermore, the amount of land that is set aside in parks and preserves is slightly larger than the total amount of developed land. Federal parks and preserves constitute 3.4 percent of the total U.S. land area, and state parks and preserves make up another 0.5 percent.[5] Note that the amount of land devoted to state parks and preserves approximately doubled from 1960 to 1990 and is growing more rapidly than developed land. Farmland, which is discussed in more detail in the next section, makes up a substantial 42 percent of total land area. So while it has been declining somewhat, there is still about ten times as much land devoted to farming as there is developed land.

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[4] For a good treatment, see Richard A. Epstein, *Takings: Private Property and the Power of Eminent Domain* (Cambridge, MA: Harvard University Press, 1985).

[5] No data is available for the land area of local government parks and preserves, but locally owned parks are common, especially in developed areas. Furthermore, federal data is from 1990, and a substantial amount of land has been added since then, for example in the expansion of the Grand Canyon park and the creation of the Escalante monument in Utah.

Table 1: Types of Land Uses in the United States, 1960 to 1990

Relatively little land in the United States is developed. Government owns more than one third of all land. Farmland is more than 40% of total land area.

	% of total land area			
	1960	**1970**	**1980**	**1990**
Federal ownership	34.0	33.5	31.7	28.6
State and local ownership	5.3	5.9	6.8	7.1
Total government ownership	39.3	39.4	38.5	35.7
—— Federal parks and preserves	1.1	1.3	3.1	3.4
—— State parks and preserves	0.3	0.4	0.4	0.5
Farmland	49.5	46.8	44.1	42.0
Developed land	2.2	2.5	3.3	3.7
Farmland *(excluding Alaska)*	59.0	55.8	52.5	50.0
Developed land *(excluding Alaska)*	2.6	3.0	3.9	4.4

Sources: All data from *Statistical Abstract of the United States*, various issues, except *1990 State and Local Ownership: USDA Economic Research Service, Major Uses of Land in the U.S.*, 1987 and 1992 (figures averaged to get 1990); Developed Land, *http://usda.mannlib.cornell.edu/data-sets/land/89003/*, USDA Economics and Statistics System; Farmland, *1992 USDA Census of Agriculture*, Table 1. Shares are calculated by the author based on a total U.S. land area of 2,271.3 million acres and 1,905.8 million acres excluding Alaska.

As Table 1 shows, developed land made up 3.7 percent of total U.S. land area in 1990.[6] The total amount of land that is developed in the United States is quite small compared to total land area, is smaller than the amount of land set aside as parks and preserves, and is smaller than the amount of land owned by state and local government. It is dwarfed by the amount of land owned by the

[6] "Smart growth" advocates cite some recent data suggesting an acceleration in development, but that data appears inconsistent with other data on housing starts and construction activity.

federal government, and by the amount of land devoted to farming. If one is really concerned about environmental preservation, it would make much more sense to focus on policies that affect the use of governmentally-owned land and farmland. Developed land just does not make up much of the total land area in the nation.

In some ways, higher-density development is harder on the environment than low-density development. For example, air pollution tends to be worse in areas of higher population density,[7] and water-related pollution can also be adversely influenced by increasing density. In high-density areas, storm-water runoff can create a substantial pollution problem as it mixes with pollutants washed off roadways and rooftops, whereas with lower densities, storm water can be absorbed into green spaces, both reducing pollution and adding to the water table. Additional sprawl in the form of lower development densities can benefit the environment, and as the data in Table 1 show, a reduction in density will still leave a substantial amount of undeveloped land. Because developed land makes up such a small fraction of total U.S. land area, a large increase in developed area would have only a small effect on the amount of undeveloped land. For example, with about 5 percent of total land area developed, an increase of 20 percent in developed area (from 5 percent to 6 percent) would only reduce the total amount of undeveloped land by about 1 percent, from 95 percent of total land area to 94 percent. If lower density development brings with it retention ponds, parks, and yards around single-family homes, there are reasons to think that it may be more beneficial to the environment than high-density development where pollutants are

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[7] See Samuel R. Staley, "The Sprawling of America: In Defense of the Dynamic City," Reason Public Policy Institute Policy Study No. 251, available on-line at *http://rppi.org/ps251.html* for documentation of the correlation between population density and air pollution. For additional evidence on the negative impact higher density development has on the environment, see Kenneth Green, "Air Quality, Density, and Environment Degradation," chapter 5 in Randall G. Holcombe and Samuel R. Staley, Smarter Growth: Market Based Strategies for Land-Use Planning in the 21st Century. (Westport, CT: Greenwood, forthcoming).

concentrated, and where extensive paving creates polluted runoff rather than allowing rainwater to be absorbed into the water table.

The percentage of land devoted to development is growing faster than the population. Since 1960, developed areas have grown by 70 percent, while the U.S. population has grown by 40 percent. This reflects the higher standard of living enjoyed by many Americans as they move to more spacious living quarters and into single-family detached homes from apartments. In 1995, 60.4 percent of total housing units in the United States were single-family detached homes. To try to reverse this trend and produce higher density means working against the amenities that people desire to purchase with their higher incomes. Even when public policy mandates construction types and lot sizes, people can use their wealth to buy more personal space. When lot sizes are restricted, people may buy two lots but just build on one, leaving the other one vacant for use as a yard. People can choose to have fewer (or no) roommates in their apartments, or can connect two adjoining condos to get more space. Even the trend toward smaller families works to lower population density. These examples show how difficult it is to design policies to increase population density when people want to use their incomes to buy more space.

Except for the bottom two rows of Table 1, various land uses are shown as a percentage of total U.S. land area, and this may distort the picture somewhat because it includes Alaska, which is largely undeveloped. Thus, the bottom two rows of Table 1 show both farmland and developed land as a percentage of U.S. land area excluding Alaska. Measuring land area that way, in 1990 farm land made up about half of total U.S. land area, and developed land consumed 4.4 percent of total land area. Still, developed land takes up a small percentage of the United States. In New Jersey, the most heavily-developed state, 32 percent of the land is developed, and in only eight states does developed land consume more than 10 percent of the state's total land area.

Reviewing the data on land use shows that only a small fraction of land in the United States is developed, so development in general is not a threat to the environment. Furthermore, governments at all levels own a substantial share of the total U.S. land area, so the

policies of governments toward their own land will have a much greater impact on the environment than the effects of real estate development. While it makes sense to set aside land for environmental amenities, there is no good argument for restricting development in general, or in promoting higher density development, for environmental reasons.

II. Preservation of Farmland

While preservation of the environment is a sensible goal, preservation of farmland is more questionable. As the previous section noted, most of the nation remains undeveloped, and farmland, while declining slightly in acreage, is not rapidly disappearing. Table 2 gives some data on farmland in the United States and shows a decline of 18 percent in total acres of farmland from 1950 to 1992, from 1,159 million acres to 945.5 million acres. Taking a longer view, however, farm acreage has increased from 1925, when there were 924 million acres. Table 2 also shows that farmland is more than 40 percent of U.S. land area, so there is approximately ten times as much farmland in the United States as there is developed land.

Table 2: Farmland in the United States, 1925 to 1992

Land devoted to farming has been declining slowly, but still makes up a substantial share of total U.S. land area, and is not in danger of being consumed by development.

	1925	1950	1974	1982	1992
Farmland, mil. of acres	924	1159	1017	986.8	945.5
Farmland, share of U.S.	40.7%	51.0%	44.8%	43.4%	41.6%
Cropland, mil. of acres	391	409	303	326	296
Cropland, share of U.S.	17.2%	18.0%	13.3%	14.4%	13.0%
Cropland, share of farmland	42.3%	35.3%	29.8%	33.1%	31.3%

Source: *Statistical Abstract of the United States*, various issues. Percentages calculated by the author using 2,271.3 million acres for all years.

Land defined as farmland is not necessarily under cultivation, and the remainder of Table 2 shows that cropland in the United States has been disappearing faster than the broader category of farmland. In 1950 there was 409 million acres of cropland, which had fallen to 296 million acres by 1992, for a reduction of more than 25 percent. Cropland has been declining as a percentage of land area, from 18 percent in 1950 to 13 percent in 1992, and also as a percentage of total farmland. In 1925, 42.3 percent of farmland was cropland, whereas in 1992 only 31.3 percent of farmland was cropland.

The primary reason cropland has been decreasing is that farm productivity has been increasing substantially. As a result, total farm output is up substantially even though less land is being cultivated. Table 3 shows some data on two major crops, wheat and corn, from 1960 to 1990. The first line of Table 3 (next page) shows that the output of bushels of wheat has more than doubled from 1960 to 1990, from 1,355 million bushels to 2,736 million bushels, and the next line shows that per capita bushels has also increased, from 7.6 bushels per person in 1960 to 11 bushels per person in 1990. This increase in output has come mainly because productivity, measured in terms of bushels per acre, has increased substantially. Dividing the number of bushels harvested by the number of acres harvested yields the next line, which shows that bushels of wheat per acre has grown from 26.1 in 1960 to 39.5 in 1990. The wheat productivity index sets 1960 equal to 100 to show the growth in productivity. Output per acre in 1990 was 151.2 percent of 1960 output. With this kind of increase in farm productivity, it is not surprising that farmland is being converted to other uses. The final line in the top section of Table 3 shows the price of wheat per bushel, in constant 1990 prices. Agricultural prices fluctuate considerably, but note the downward trend, and that the 1990 price of wheat is far less than half the 1960 price. Again, this provides a motivation to convert farmland to other uses.

The middle section of Table 3 shows the same data as the top section, but for corn. The same trends are evident. Corn output, measured in bushels and in bushels per capita, has increased substantially, and bushels per acre has grown even more rapidly for

Table 3: Farm Productivity in the United States, 1960 to 1990

Farms are producing more output than ever before. Farm productivity has risen the past several decades. Farm acreage has declined because more food can be grown on fewer acres.

	1960	1970	1980	1990
Wheat, million bushels	1355	1352	2374	2736
Wheat, bushels per capita	7.6	6.7	10.5	11
Wheat, bushels per acre	26.1	31.0	33.4	39.5
Wheat, productivity index	100	118.8	128	151.2
Wheat, real price per bushel	$7.68	$4.48	$6.20	$2.61
Corn, million bushels	3907	7152	6645	7934
Corn, bushels per capita	21.8	35.2	29.3	31.9
Corn, bushels per acre	54.7	124.7	91	118.5
Corn, productivity index	100	228	166.4	216.6
Corn, real price per bushel	$4.42	$2.60	$4.93	$2.28
Total dollar value of output ***(billions of 1990 $)***				
Wheat	$10.41	$6.06	$14.72	$7.41
Wheat index	100	58.2	141.4	71.2
Corn	$17.25	$18.60	$32.78	$18.09
Corn index	100	107.8	190	104.9
Total farm output	$177.40	$215.00	$157.70	$180.40
Total index	100	121.2	88.9	101.7

Source: Raw data from *Statistical Abstract of the United States,* various issues. All prices are adjusted to constant 1990 dollars. Costs per bushel are total bushels produced (shown in table) divided by total sales (not shown). Productivity indexes show changes in bushels per acre, and output indexes show changes in total dollar value of output.

corn than wheat. The index of 216.6 shows that bushels per acre of corn in 1990 was more than twice its level for 1960. Again, the price is volatile, but is much lower in 1990 than in 1960.

The bottom section of Table 3 shows the total dollar value of wheat, corn and all farm output in each year, again in constant 1990 dollars. Note that while output in physical terms has grown, the dollar value has not. The dollar value of total wheat production in

1990 was only 71.2 percent of its 1960 value, and the dollar value of corn has risen only slightly to 104.9 percent of its 1960 value. Likewise, total farm output in 1990 was valued at 101.7 percent of its 1960 value. Output and productivity have gone up substantially, but prices have come down equally far, leaving the value of output almost unchanged.

A look at the data shows that there is no reason to be concerned about development crowding out farming and shrinking farm acreage. Farm productivity has been increasing spectacularly, more than compensating for the decline in farmland. When so much more can be grown per acre, the number of acres devoted to farming will decrease, not because development is crowding out farming but because less land is needed to feed the population. Agriculture prices have been falling, indicating that farm products have become more plentiful relative to demand. Farm acreage would be declining regardless of development trends.

III. Traffic Congestion

One of the most immediate concerns of those who live in growing areas is traffic congestion. While traffic congestion has increased in many areas, the average commute time has been relatively constant. The fact that average commuting times have remained almost unchanged for decades despite universal complaints of increased traffic congestion requires some analysis to understand. Once understood, however, the facts show the problems lie with public policies designed to relieve traffic congestion by increasing population density and reducing dependence on automobile travel. In fact, urban sprawl is not the cause of traffic congestion, but is the way to escape it. When people move out to the suburbs, jobs tend to follow them, and commuting time is reduced both for those in the suburbs and for those in the cities. When growth limits try to put more people and jobs in already-congested areas, it is not surprising that traffic problems worsen. Some new urbanists hope that increased traffic congestion will push more commuters toward public transportation, but as the analysis below shows, in most areas mass transit has little potential to alleviate traffic congestion.

Table 4: Travel Time to Work, 1980 and 1990

Commuting times remained approximately constant from 1980 to 1990. About half of all commuters have commutes under 20 minutes and only a few have very long commutes.

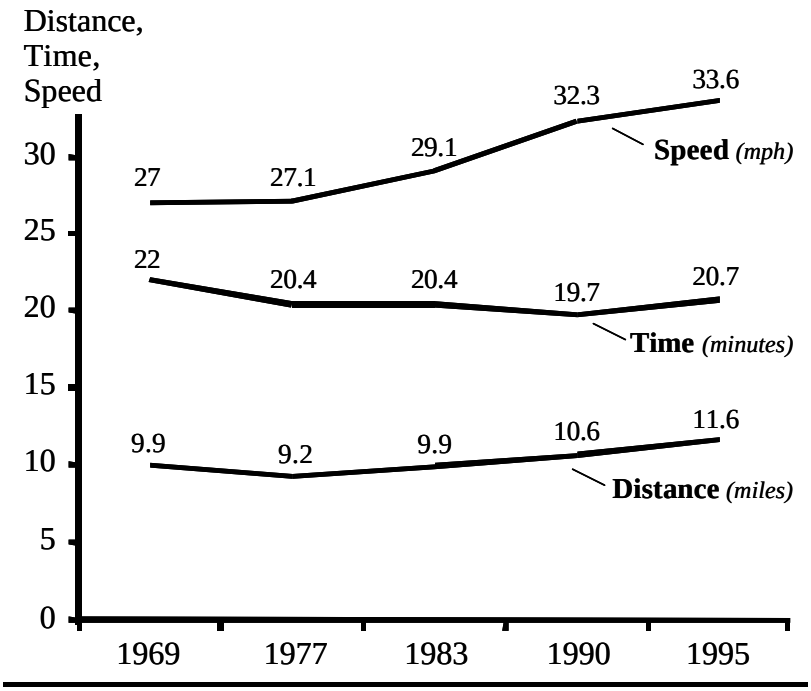
	— 1980 —		— 1990 —	
	millions	**%**	**millions**	**%**
16 years and over not working at home	94	100%	111	100%
Less than 10 minutes	17	17.9%	18	16.4%
10 to 19 minutes	32	33.7%	37	33.1%
20 to 29 minutes	19	19.9%	22	20.1%
20 to 44 minutes	16	16.9%	20	18.0%
45 minutes or more	11	11.6%	14	12.5%
Average travel time:	***21.7 minutes***		***22.4 minutes***	

Source: *Census of Population*, 1989-1990, General Social and Economic Characteristics, US Summary.

Table 4 shows that most Americans have commutes of less than 20 minutes, and that from 1980 to 1990 there was minimal change in commuting times for Americans. In 1980, 51.6 percent of commuters had travel times under 20 minutes, and by 1990 49.5 percent had travel times under 20 minutes. The mean travel time rose only slightly from 21.7 minutes to 22.4 minutes from 1980 to 1990. The percentage of commuters who traveled 45 minutes or more rose from 11.6 percent in 1980 to 12.5 percent in 1990. The overall data show that while some Americans spend more time commuting, the average commute has increased very little and the majority have reasonably short commutes.

Figure 1: U.S. Average Commuting Distance, Time and Speed, 1969 to 1995

Over the past several decades, people have, on average, been commuting over longer distances and at greater speeds. Despite this, the average commuting time has not changed much.



Note: Data are from the *Public Purpose Urban Transport Fact Book*, available online at (*http:// www.publicpurpose.com*).

Figure 1 shows much the same thing, looking at commuting distance, time, and speed for years from 1969 to 1995. For the population as a whole, commuting time has remained roughly constant at around 20 minutes, but both commuting distance and average commuting speed have increased significantly. The impact of the energy crisis of the 1970s is apparent in that data, as commuting distances shortened from 9.9 miles in 1969 to 9.2 miles

in 1977, in the opposite direction of the trend in the rest of the series. Since 1977, average commuting distance has increased 26 percent, from 9.2 miles to 11.6 miles, and at the same time average commuting speed has increased 24 percent from 27.1 mph to 33.6 mph, leaving average commuting time approximately unchanged. People are commuting longer distances, which is consistent with lower-density development, but contrary to the common impression, commuting speeds are not slowing down, and average commute times are not growing longer. Traffic congestion is getting worse on many existing roads, but average commuting times remain stable as people and jobs move to the suburbs where commuting times are shorter.

Figure 1 reveals how Americans respond to changing energy prices. When energy prices rose in the 1970s, commuting distances fell as, in response to higher commuting costs, people chose to live closer to where they worked. Conversely, average-commuting distances rose nearly 10 percent from 1990 to 1995 as lower energy prices allowed commuters a greater choice of places to live relative to their work. Many commuters make a sensible choice to live a bit further from where they work in exchange for better living conditions. The data also show that because commuting speeds have been rising, workers have not, on average, spent more time commuting, even though they have increased their travel distances.

Public transportation versus single occupancy vehicles

One factor leading toward increased commuting speed is the increase in commuters who travel in single occupancy vehicles. Table 5 shows a breakdown of commuters by mode of travel, and the increase in single occupancy vehicle travel is apparent. In 1960, 64 percent of commuters drove to work, and that figure increased to 86.5 percent in 1990. The breakdown between carpoolers and single occupancy vehicle commuters is not available until 1980, but even there, those commuting by themselves rose from 64.4 percent of commuters in 1980 to 73.2 percent in 1990, while carpooling fell from 19.7 percent of commuters in 1980 to 13.4 percent in 1990. The decline in those using public transportation is even more dramatic,

Table 5: Share of Commuters Using Different Modes of Travel to Work, 1960 to 1990

The share of commuters traveling in private vehicles has increased substantially, while public transportation's share of commuters has fallen greatly.

	share of commuters			
	1960	**1970**	**1980**	**1990**
Car, truck, or van	64%	77.7%	84.1%	86.5%
Drove alone	—	—	64.4%	73.2%
Carpooled	—	—	19.7%	13.4%
Public transportation	12.1%	8.9%	6.4%	5.3%
Walked only	9.9%	7.4%	5.6%	3.9%
Other means	6.9%	2.5%	1.6%	1.3%
Worked at home	4.3%	3.5%	2.3%	3%

Sources: Census of Population, 1960, 1970, 1980, 1990.

falling from 12.1 percent of commuters in 1960 to 6.4 percent in 1980 to 5.3 percent in 1990.

These facts can be interpreted in a number of different ways. For those who promote mass transportation the trends are discouraging, but there is a silver lining behind this cloud. Americans like suburban living, where mass transportation is less feasible. With growing numbers of commuters in single occupancy vehicles, they are better able to come and go as they want, without concern for the schedules of others in their commuting groups. They can make side trips if they choose, and they can live outside the reach of mass transit if they desire. At the same time, the data above show that on average, commuters are not spending any longer in their commutes and are traveling faster. One reason is that traveling by auto is generally faster than by mass transit, so the migration from mass transit to auto commuting has been an important factor in holding commuting times down.

Table 6: Commuter Time — Single Occupant Auto versus Public Transportation

Commuting by car is faster than by public transit. The time advantage to auto commuting is not great for central business district commuters, but even there it still takes about three-quarters as much time to drive as it does to take public transit.

	Metropolitan Area			**Central Business District**		
	Car	Public Trans	Car relative to public	Car	Public Trans	Car relative to public
	— minutes —		*— percent —*	*— minutes —*		*— percent —*
Atlanta	26	40.7	63.9%	30.3	39.4	76.9%
Chicago	26	46.4	56.0%	34.9	48.4	72.1%
Dallas-Ft. Worth	24.5	40.4	60.6%	28.4	38.9	73.0%
Houston	25.5	44	58.0%	29.6	45	65.8%
Los Angeles	25.6	41.5	61.7%	33.4	43	77.7%
New Orleans	23.8	36.9	64.5%	27.4	35.2	77.8%
New York	24.8	47.4	52.3%	43.8	50	87.6%
Portland	23.4	34	68.8%	23.4	34	68.8%
Seattle	23.4	42.6	54.9%	25.7	40.6	63.3%
San Francisco	24.2	41.5	58.3%	33.1	41.8	79.2%
Washington	27	41.2	65.5%	24.9	31.1	80.0%
Average (25 cities)	***23.6***	***39.1***	***60.4%***	***28.5***	***38.7***	***73.6%***

Source: Commuting times from The Public Purpose Urban Transport Fact Book (http://www.publicpurpose.com). Car relative to public calculated by the author.

Note: Average row is for the 25 largest U.S. central business districts, and includes cities not shown separately.

The time advantage for single occupancy automobile commuting is further illustrated in Table 6, which shows average commuting time for single occupancy autos and public transportation for selected cities as well as for the average of the 25 largest central business districts in the nation. The first thing to notice is that travel time is always greater when public transportation is used than when

commuters travel in single occupancy automobiles. This should not come as a surprise, because public transportation does not necessarily follow a direct route from origin to destination, and often has frequent stops to take on and discharge passengers. Yet another factor that adds to total time (but not travel time) is that one often must wait for public transportation to arrive, and the stops are often some distance away from the commuter's origin and destination. Thus, for most commuters, one obvious way for an individual to reduce total commuting time is to travel by single occupancy auto, and Table 5 showed the trend in that direction.

Because single occupancy auto is almost always the fastest way to commute, public transportation advocates face a considerable challenge. It is not an easy task to convince commuters to extend their commuting times, reduce their flexibility in terms of times they can commute, and reduce convenience both by making it harder to take side trips and by making it harder to carry computers or purchases. For most individual commuters mass transit has few advantages (it does eliminate the need to find a parking space) but many disadvantages. The advantages of mass transit may be shared with others in terms of lower total energy usage and pollution, and less road congestion. However, the energy usage is a cost drivers choose to accept for the convenience and flexibility of auto commuting. As Table 5 shows, by 1990 only about five percent of commuters nationwide used public transportation, so if all those commuters using public transportation drove their own autos instead, the average increase in traffic congestion in most areas would be slight.

This is not the case in large metropolitan areas, however. Table 7 (next page) shows that in the 25 cities with the largest central business districts, about 25 percent of all trips are taken by public transportation. In higher density central business districts, the number is considerably higher, with New York leading the group with 73.2 percent of all trips in the central business district occurring on public transportation. Chicago, second on the list, has a public transportation market share of 60.7 percent in the central business district. Boston, in third place (and not shown separately on Table 7) has 48.5 percent of trips occurring on public transportation, and San

Table 7: Public Transportation Market Share, 1990

Public transportation has a sizable market share in many central business districts, while outside these areas, even in the nation's most densely populated areas, its market share is small.

	Metropolitan Area	Central Business District	Outside Central Business District
Atlanta	4.6%	15.9%	3.7%
Chicago	14.1%	60.7%	9.3%
Dallas-Ft. Worth	2.4%	13.9%	0.9%
Houston	3.6%	16.1%	2.6%
Los Angeles	4.5%	14.3%	4. 0%
New Orleans	6.9%	15.1%	5.1%
New York	23.7%	73.2%	11.9%
Portland	5.3%	20.0%	4.3%
Seattle	5.9%	34.2%	3.9%
San Francisco	9.1%	45.0%	6.5%
Washington	10.9%	37.0%	8.3%
Average (25 cities)	***6.8%***	***25.7%***	***4.4%***

Source: The Public Purpose Urban Transport Fact Book (*http://www.publicpurpose.com*). Average is for the 25 largest U.S. central business districts, and includes cities not shown.

Francisco, in fourth place, has a public transportation market share of 45 percent. While public transportation plays a minor role in most areas of the nation, it plays a more prominent role in the central business districts of the nation's largest cities.

Outside the central business district, public transportation's role is small, even in the nation's largest city. Only in New York, where public transportation accounts for 11.9 percent of the trips, is the public transportation market share more than 10 percent. It is 9.3 percent in Chicago and 7.9 percent in Boston, and only 4.4 percent for the average in the 25 cities with the largest central business

districts. Public transportation is a major part of the transportation network in the central business districts of large cities, but has a minor impact on traffic congestion elsewhere. It is important for those who use it, of course, but outside of large central business districts, it has a minimal impact on relieving traffic congestion.

Table 6 shows that, for all commuters in the metro area, travel time for automobile commuters is shorter, on average, than for those traveling to the central business district. This suggests that to reduce commuting time, development should be more decentralized so that more commuters have opportunities to work outside the central business district where commuting times are lower. The next section discusses development patterns in more detail, but note this fact: in the average of all of the 25 largest central business districts, public transportation commuting time was actually lower for those going to the central business district than for the total metro area. In Washington, for example, those commuting to the central business district via public transportation spent about 10 minutes less commuting than those using public transportation within the total metro area. However, in no case was the average time less to commute to the central business district by public transportation than by single occupancy auto in the larger metro area. The quickest commutes are by auto to locations outside the central business district.

It is apparent that larger populations are associated with greater reliance on public transportation, but the relative time cost of traveling by public transit compared to automobile is also a factor. Table 6 shows that it takes only 73.6 percent as much time to commute by single occupancy auto as to commute by public transportation. A statistical analysis of this data shows that if the time advantage of auto travel declines, the percentage of commuters using public transportation rises, so more people would take mass transit if it became relatively faster, or if auto commuting became relatively slower. Some regression equations appear in Table A1 in the appendix, along with a brief discussion of the results. Because commuters are more likely to take mass transit if the time disadvantage is smaller, one “smart growth” strategy is to try to create traffic congestion to encourage commuters to take mass

transit. However, even if public transportation's market share doubled from five percent to ten percent, in most places commuters would still be traveling by car, and traffic congestion would not be much affected.

Mass transit has been one of the major elements behind the idea of sustainable development and "smart growth", but the facts show that its potential is limited, and that it is likely to have a major impact only in the central business districts of the nation's most heavily populated cities. Outside the central business district, public transportation use is small even in the nation's largest metro areas and has a minimal impact in relieving traffic congestion. Single occupancy automobile travel is on average substantially faster, even in central business districts that are well served by public transportation. As the nation becomes more affluent, it makes sense that more people will want to opt for reducing their travel time and adding to their travel convenience by commuting by automobile. Thus, except in the nation's most populated central business districts, the focus of transportation policy should be on facilitating the flow of automobile traffic rather than trying to promote public transit, which is in general slower and less convenient.[8]

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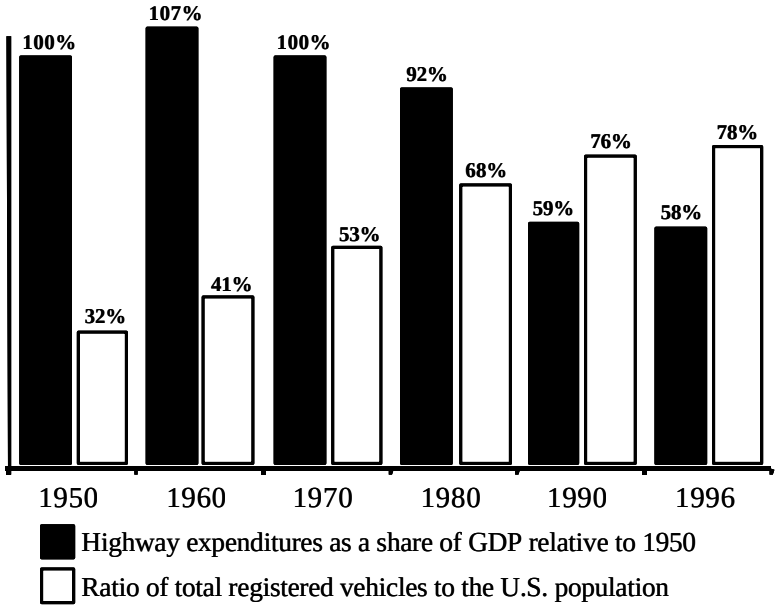
[8] Another issue, which is beyond the scope of this study, is what type of mass transit is most desirable. "Smart growth" advocates tend to favor rail transit, but buses have substantial advantages over rail because they are cheaper to operate and are more flexible because it is easy to change the route structure in response to rider demands. See Jonathan E.D. Richmond, "A Whole-System Approach to Evaluating Urban Transit Investments," *Transportation Reviews* (forthcoming), for a careful analysis showing that busses are cheaper to operate than rail. In the systems Richmond analyzes (in Los Angeles, Baltimore, Buffalo, Dallas, St. Louis, Miami, and Pittsburgh), none of the rail systems were even able to cover their operating costs from fares, and capital costs were routinely underestimated, sometimes by a factor of four or more. For the Los Angeles Blue Line light rail, for example, fares were only 13.1 percent of its operating costs, Baltimore fares were 32.6 percent of operating expenditures, and in St. Louis fares covered 23.0 percent of operating expenses.

Figure 2: State Highway Expenditures and Motor Vehicle Registration, 1950-1996

Highway expenditures as a share of GDP have fallen substantially since 1960. Meanwhile, there has been a steady increase in registered vehicles as a percent of the population.



Note: Data are from the *Public Purpose Urban Transport Fact Book*, available online at (*http:// www.publicpurpose.com*).

Highway funding and transportation policy

While there are strong arguments for enhancing the highway network, transportation policy has, in fact, been going the other way. Most highway expenditures are made by state governments, and Figure 2 shows that state government highway expenditures as a percentage of GDP have been declining in past decades. In 1950 state highway expenditures were about 1.3 percent of GDP, which is

shown as 100 percent in Figure 2, and rose to 1.39 percent of GDP in 1960, which is 107 percent of the 1950 number. In 1970, highway expenditures were 1.3 percent of GDP, about where they were in 1950, but since then they have steadily declined. One can speculate on the reason for this decline: states have increasingly moved their expenditures away from infrastructure toward human resources; the energy crisis in the 1970s caused policy makers to try to discourage driving; and the increased emphasis on land use planning has been toward higher-density development and the use of mass transit. Whatever the reason for the reduction, if the level of highway expenditures had remained at their 1970 level, there would be less traffic congestion and easier commuting for most Americans.

State highway expenditures in 1996 were $58.3 billion. If states spent the same percentage of GDP on highways in 1996 as they spent in 1950 or 1970, expenditures would have been $100.5 billion, and if they had spent the same percentage as in 1960, highway expenditures would have been $107 billion. Critics argue that there is no point in building more highways because as soon as they are built they become congested, partly because people take more trips and partly because they choose to live further from work and other travel destinations. What this criticism overlooks is that most of the traffic on new roads comes from existing roads, so while new roads fill up, congestion is relieved on old roads. Also, while over the last half of the 20th century the percentage of the population driving on highways has increased substantially, it cannot increase much further.

Figure 2 shows total motor vehicle registrations (cars, trucks, and busses) as a percentage of the U.S. population. In 1950 there was less than one registered vehicle for each three people in the nation. By 1970 there were more than half as many registered vehicles as people (52.9 percent), and by 1996 there were 77.7 percent as many vehicles as people in the nation. This figure includes total population, not registered drivers, so motor vehicle ownership has spread to the point where there is more than one registered vehicle per driver.[9] During the 1950s and 1960s as automobile ownership

[9] In 1997, 21.7 percent of the population was under 15 years of age.

was growing, more and more people had access to cars, adding to traffic congestion. Furthermore, as female labor force participation increased, more women, who once might have stayed at home, were adding to the rush hour traffic. At the beginning of the 21st century, drivers could add to congestion by taking more and longer trips, but there will not be any substantial increase in the percentage of people driving, because most of the driving-age population already has access to cars.

Figure 2 shows that as the total number of vehicles has increased over the decades, the percentage of GDP allocated to highway expenditures has declined, especially since 1970. One of the big contributors then to increased traffic congestion is reduced highway expenditures. Mass transit is not the solution to traffic congestion, but it does have an important role to play for those citizens who cannot travel by auto. In the 21st century, public transportation should be viewed more as a social service than as an alternative to the private automobile.

IV. Land Use Patterns

One of the primary ways planners have tried to manage growth in the 20th century has been the attempt to redesign land use patterns to produce "smarter" growth patterns. Higher density development, urban infill, and the designation of urban areas outside of which development is highly restricted are some of the methods that have been advocated to create smarter growth patterns. This section discusses the effects of applying these instruments to affect patterns of growth. Urban growth boundaries are a common tool for managing growth, and the other three land use patterns discussed in this section – leapfrog development, strip or ribbon development, and low density single-dimensioned development – are often used as indicators for identifying land use patterns that qualify as urban sprawl.[10]

[10] Two of the states that have the greatest level of state-wide controls on growth are Oregon and Florida. Florida's growth management policies were

Urban growth boundaries

One strategy for preventing sprawling development is to create an urban growth boundary and to discourage or prevent development outside the boundary. As population grows, restrictions on development outside the boundary will encourage infill and higher-density development inside the boundary. In a growing area, the urban growth boundary can be enlarged to accommodate an increasing population, but proponents of urban growth boundaries envision them as tools to increase population density within the boundary. It almost goes without saying that restricting the area in which development is allowed will increase congestion in the developed area, but increased congestion is one of the things people dislike about growth. As discussed earlier, there is no good reason to restrict development in order to preserve undeveloped land, so one must question what other benefits might be created by urban growth boundaries.

By restricting land available to be developed, one effect is that the price of developed and developable land will rise, making housing and other developed property more expensive. This is a straightforward implication of the laws of supply and demand. The less land there is available for development, the more costly that land will be. Thus, goals such as affordable housing will have to be compromised as a result of urban growth boundaries. In many areas, the problem of providing affordable housing is dealt with by other government programs, such as the construction of low-income housing. The negative effects of one government program lead to the creation of other government programs, and government housing programs and housing subsidies have, in turn, created their own sets of problems.

By raising the value of developed and developable land, and depressing the value of land off limits to development, urban growth boundaries create gains for some people and losses for others. The

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modeled after Oregon's, and these sprawl criteria are listed in the Florida Statutes 163.3177(9).

big short run gainers are the owners of property within the urban growth boundary. The boundary means that those with land outside the boundary cannot compete by developing their property, so those who own developed and developable property will see their property values rise as a result of the boundaries. The losers are those who have property outside the urban growth boundary, and renters inside the boundary, because rents will rise as property values rise.

The loss in the market value of property outside the urban growth boundary can hurt even those property owners who have no intention of developing their property. For example, farmers can get lines of credit using their land as collateral, and if the value of their property is depressed because it lies outside the urban growth boundary, it can reduce their ability to borrow against the land. Because the urban growth boundary raises property values within its borders, those homeowners will find the market values of their homes rising, while renters will find their rents rising. Homeowners tend to be more wealthy than renters, so the urban growth boundary tends to make the wealthy better off financially, and make the poor worse off, because they must pay higher rents. Because urban growth boundaries tend to favor the rich over the poor, and because the rich tend to be more politically involved than the poor, this gives an indication of the origin of some political support for urban growth boundaries. Urban growth boundaries provide a political mechanism whereby those who are well off can further their public policy goals by imposing costs on the poor.

As people in an area become wealthier, population density tends to decrease, because people want to buy more square feet of living area and have a greater opportunity to live in single-family detached housing. Urban growth boundaries are an attempt to increase population density and take away some of these opportunities, but there is no indication that this higher density living increases the standard of living in any dimension. As noted earlier, it is not necessary for environmental reasons, and its effect on traffic congestion will be adverse, because it puts more commuters in a smaller area, but the policy will have a minimal effect on the use of mass transit. Urban growth boundaries worsen the problems in urban areas without offering compensating benefits in return.

Leapfrog development

Leapfrog development occurs when new development takes place away from already-developed areas, leaving undeveloped areas in between. Leapfrog development has been criticized on several grounds.[11] It may raise infrastructure costs (discussed further below), because infrastructure like roads and sewers must be extended past undeveloped areas to the leapfrogging development. It also increases transportation costs and automobile use because commuting distances are longer than if land closer in had been developed instead. It also can fragment ecosystems. Leapfrog development occurs because land is cheaper further from the urban core, allowing people to have larger lot sizes and to purchase more housing amenities for a given amount of money.

When analyzing leapfrog development, its advantages and disadvantages look different depending upon whether the development is viewed as a static outcome or as a part of a dynamic growth process. In a growing area, once a parcel is leapfrogged, the leapfrogged land becomes a better location for future development and infill will occur. In the long run, leapfrogging can lead to higher density development and shorter commutes. The reason is that higher density development tends to occur in central locations rather than on the periphery of developed areas. Businesses want to be centrally located to attract customers, and centrally located land will be more valuable and thus for economic reasons will tend to be more densely developed. When an area is leapfrogged, it becomes a more central location that is better suited for commercial development and higher density development. The leapfrogged area is a good location for shopping centers, office buildings, professional centers, and apartments. Thus, if one looks ahead in the growth process,

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[11] See Randall G. Holcombe, *Public Policy and the Quality of Life* (Westport, CT: Greenwood, 1995), ch. 5 for a more detailed analysis of leapfrog development and the other development patterns discussed in this analysis.

leapfrogging creates the environment for higher density future development in the leapfrogged areas.

In the longer run, leapfrogging can lead to shorter commuting times because rather than having business and commercial activity concentrated in the urban core, the commercial areas that will tend to develop in the leapfrogged land become employment centers and shopping areas. This gives people opportunities to live closer to where they work and shop. The leapfrogged areas develop into activity nodes that produce more efficient development patterns than cities with one main urban core. With a central city, people tend to commute in during the day and back to the suburbs at night, creating traffic congestion and creating ever-increasing commuting distances as suburbs are built further from the urban core. With activity nodes that are promoted by leapfrog development, people can live close to the activity node where they work, and even in a growing area, commuting distances can remain relatively short. As Table 7 showed, commuting times for most cities are longer for those who are commuting to the central business district than for the average of all commuters in a metropolitan area. Thus, because leapfrogging encourages the development of employment locations away from the central business district, it can be an efficient pattern of development that produces shorter commutes and higher development densities.

Strip or ribbon development

Strip or ribbon development occurs when areas along major arterial roads are developed, leaving undeveloped land between those developed strips. In a manner similar to leapfrog development, it requires infrastructure to be extended further out than if the areas between the strips were developed, and it spreads the boundary of developed land beyond where it would need to be if there was infill. Yet, when viewed as a dynamic process rather than a static outcome, strip or ribbon development can lead to efficient land use patterns. Locations on major thoroughfares are ideal for businesses because they want to be located conveniently to drivers. As that development takes place, it creates the ideal locations for residential communities between the strips. People want to live away from the traffic on busy

thoroughfares, yet convenient to shopping and transportation corridors. Thus, such strip development creates the ideal location for residential subdivisions to be located closer to the urban core, and ultimately leads to higher density development than if subdivisions are placed on the periphery of developed areas.

As it has occurred in many places, strip or ribbon development has brought with it some disadvantages. One is unsightly strip malls along transportation corridors. Another is increased congestion as traffic entering and leaving commercial establishments impedes the flow of through traffic on transportation arteries. These disadvantages are not inherently a part of strip or ribbon development, however, but are the result of inadequate planning for rights-of-way. By planning in advance, commercial development can be kept far enough away from the roadway to allow it to be widened as traffic increases, to allow the construction of access roads to minimize the impact of traffic entering and leaving the roadway, and to allow visual buffers and landscaping to enhance the visual appeal of the area. Problems occur not because of the development itself, but because of inadequate planning for growth. Commercial developers choose their locations in anticipation of a sufficient volume of traffic to maintain their businesses. Government should encourage such development and plan for sufficient right-of-way to accommodate those businesses. Problems occur when development is allowed adjacent to the right-of-way, without allowing sufficient room for the infrastructure to service the development.

Low-density single-dimensioned development

This development pattern refers to large housing subdivisions that require residents to drive everywhere they go. The low density can be viewed as a problem because it takes more land to support a given number of people, but often that is just the advantage that its residents were seeking. Many people like to live in single-family detached houses with their own yards, and in this sense, the low density is an advantage, not a disadvantage, because it creates the lifestyle that many Americans prefer.

In analyzing this type of development, one must recognize that the single-dimensioned aspect is often aggravated by government regulations and policies. Leapfrog and strip or ribbon development encourage business and commercial development near residential areas. By discouraging these types of development, public policy actually encourages single-dimensioned development. Furthermore, zoning laws often prevent mixed use of property. Thus, one side effect of government policies, including those intended to prevent urban sprawl, is to promote low-density single-dimensioned development. Zoning and other policies that encourage single-dimensioned development were enacted in response to citizen preferences, but there is an increasing recognition, by developers, residents, and planners, that mixed use development is desirable and can be built in ways that preserve residential amenities. Additional government policies are not necessary to encourage mixed-use development, but existing policies sometimes do stand in the way.

Markets, planning, and land use patterns

There is a tendency to think that if government does not plan land use patterns, then development patterns will be haphazard. In fact, the market mechanism provides guidance so that individual landowners can plan for the use of their property in a manner that generates a coherent overall pattern of land use. The issue, then, is centralized government planning versus decentralized market planning. People might be concerned that without government restrictions, someone might build a gas station or convenience store in the middle of their residential neighborhood, but market incentives work against incompatible uses of land. The invisible hand of the market can help produce efficient land use patterns just as it can efficiently produce goods and services.[12]

[12] The legal system can also play a role. Restrictive covenants for residential subdivisions can prevent commercial uses of land, or can restrict housing to single-family detached housing, without the necessity of zoning or other government regulations. See Bernard H. Siegan, *Land Use Without Zoning* (Lexington, MA: D.C. Heath, 1972).

Market incentives lead businesses to locate on busy transportation corridors, near major intersections, and near other businesses to make them more accessible to customers. People want to live in residences that are convenient to transportation corridors, shopping locations and their employment, but that are far enough away to avoid the negative impacts of high traffic volume. Thus, the locations that are naturally more desirable for commercial use and for residential use are different, and market forces will naturally tend to keep them separated. Although there will be a natural separation of business and residential locations, there are also market forces that lead business and residential land uses to be intermixed. Market forces naturally produce activity nodes of commercial locations that will be surrounded by residential locations conveniently located to those activity nodes.

Similarly, industrial sites are best located where land is less expensive, and near transportation corridors like major highways and railroads, which are not good residential locations. Industrial developers will look for lower-priced land that is not as desirable for residential or commercial use, so market incentives work to keep industrial locations separated from residential and commercial locations. The invisible hand of the market guides land use decisions so that individual landowners, making their own plans, are coordinated by market incentives to produce efficient overall land use patterns.

Central planning of land use can often interfere with these market forces and produce less desirable patterns than if the market was left to allocate land. As noted above, policies to prevent leapfrog development and strip or ribbon development, and the creation of urban growth boundaries, can inhibit the development of activity nodes and produce more traffic, longer commutes, and less efficient development patterns. The imposition of urban growth boundaries means that a larger share of workers must commute to the central city rather than a nearby activity node, and it creates a disincentive to higher-density development that can occur in undeveloped central locations created by leapfrogging. Similarly, zoning laws can discourage mixed use of land and can turn land use decisions into purely political decisions that are excessively influenced by people

who have only a peripheral interest in the issues. Market-based decisions, on the other hand, tend to be efficient because landowners want their land to be allocated to its highest-valued use. The market system gives landowners the incentive to maximize the value of their property.

It is worth emphasizing that this section is discussing the timing of development and overall development patterns. If, for environmental reasons, the highest valued use of the property is to preserve it in its natural state, then government should purchase the property and preserve it. But data earlier in this study has already shown that there is no compelling reason to limit the amount of land that can be developed, or to prefer higher-density development for its own sake. Individual landowners, making their own plans, will produce efficient development patterns when guided by the incentives of the market.

V. The Costs of High Density Development

Opponents of urban sprawl have argued in favor of higher density development. Increased density uses up less open space, and may require less infrastructure to support. As noted earlier, however, development is not a threat to open space, because such a small percentage of the United States is developed. Furthermore, the infrastructure advantage may not be as great as at first it appears, because roads must be wider if the same amount of traffic is to be handled in a smaller area. Also, if higher traffic densities mean that roads use interchanges and overpasses instead of ground-level pavement, infrastructure costs can go up even more. There may be negative environmental impacts to higher density development as well. Low-density development has more open space to absorb storm water runoff, for example, which is a major source of water pollution. Air pollution tends to be higher in more densely populated areas, because sources of pollution are more concentrated.[13] Higher

[13] This is documented in Samuel R. Staley, "The Sprawling of America: In Defense of the Dynamic City," Reason Public Policy Institute Policy Study No. 251.

densities mean more congestion, more pollution, and higher land costs and thus tend to lower the standard of living. There may be offsetting effects, such as greater job opportunities, and more opportunities for shopping and entertainment, so one cannot conclude that higher densities necessarily make people worse off. However, they do tend to subject people to more pollution and higher living costs.

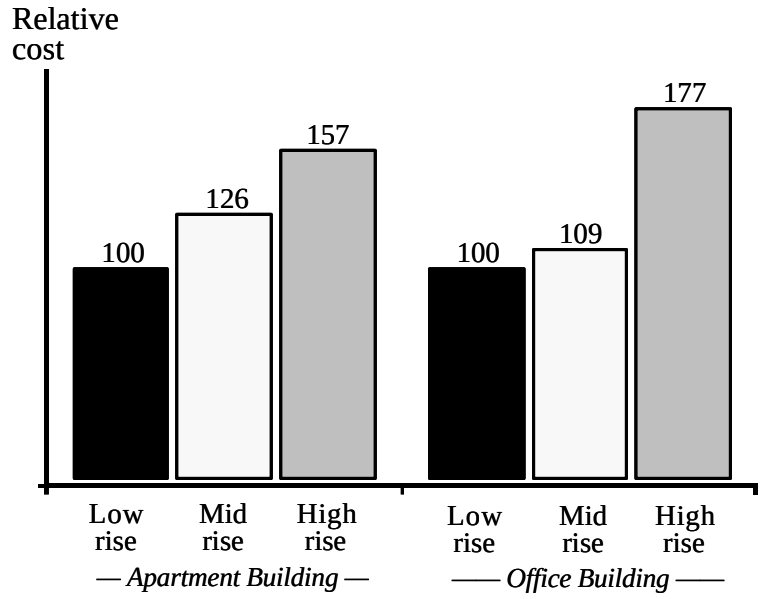
Increases in population density create higher construction costs. It costs more to build a highway interchange, for example, than a ground-level intersection; it costs more to build a parking space in a parking garage than in an outdoor lot; and it costs more to build a high-rise office or apartment than to build a low-rise building. Figure 3 presents some indexes to demonstrate the differences in costs. These indexes are estimates using building cost construction data, and their calculation is explained in Table A2 in the appendix. The data show, for example, that the cost of building a parking space in a parking garage is about 14 times as high as building a space in a parking lot that is paved with 6 inch thick concrete. The construction cost for a square foot of space in a parking garage is about 55 percent as much as a square foot of space in a low-rise apartment, whereas a square foot of parking space in a ground-level lot is only about four percent as expensive as a square foot of apartment space. Clearly, when densities get high enough to warrant parking garages rather than ground-level parking lots, costs go up significantly.

The indexes in Figure 3 are for construction costs only and do not include the cost of land. Of course, when land prices are high, it pays to have higher-rise buildings to reduce land usage, but what the data in Figure 3 show is that it is considerably more expensive to undertake high-rise construction than it is to undertake low-rise construction.

The construction cost index is set at 100 for low-rise construction and assumes that a low-rise apartment and a low-rise office will have a parking space associated with it. A mid-rise building of 4 to 7 stories, again with one outdoor parking space, will cost 126 percent as much as the low-rise apartment, and a high-rise apartment in a building of 8 to 24 stories with a garage parking space will cost 157 percent as much as the low-rise apartment. Data in

Figure 3: High-Density Versus Low-Density Construction Cost

High density construction is much more expensive than low density construction.



Source: Appendix 2.

Table A2 show that even with no parking space, the high rise will cost 144 percent as much as the low rise with parking. The story is similar with the office space. An office in a mid-rise building will cost 109 percent of one in a low-rise building, both with a space in a parking lot, while an office in a high-rise building with a space in a parking garage will cost 177 percent of the cost of the low rise office. Again Table A2 shows that a high-rise office without parking costs 130 percent of a low-rise office with a parking space. These construction cost indexes show that neglecting the cost of land, it

costs more to house or employ people in a higher-density development than in a lower-density development.

The reason why the market often favors high-density development (for example, in Manhattan, or downtown Chicago) is that land costs are so high that the higher construction costs associated with high-density development are offset by the smaller amount of (high-cost) land used. The indexes in Figure 3 show, however, that if public policies encourage higher-density development than would be produced by the market, the overall cost of development will rise. It is cheaper to build low-density developments and have people commute by auto than it is to build high density developments and have people take mass transit. One might counter that the cost of infrastructure is cheaper with higher densities, but even this is not clear. It is more expensive to build highway interchanges than ground-level intersections, and often infrastructure like sewer lines are at capacity in inner cities. Retrofitting and increasing capacity in already-developed areas is typically more expensive than installing new infrastructure for new construction.

Not only does it cost more to build high-density development, it costs more to provide government to higher-density development. For example, in New York City, where the population density is about 24,000 people per square mile, the per capita cost of city government in 1995 was $5,241, whereas in sprawling Houston, Texas, with a population density of 3,230 people per square mile, the per capita cost of city government was only $979. Boston, with a population density of 11,529 people per square mile, had per capita city government expenditures of $3,144. By comparison, Cleveland, with a population density of 6,468 people per square mile – slightly more than half of Boston's population density – had per capita city government expenditures of $1,348, which is well less than half of Boston's per capita expenditures.

To get a more systematic view of the relationship between per capita government expenditures and population density, Table A3 in the appendix presents some regression results for 28 large U.S. cities. Those results show that an increase in density of one person per square mile increases per capita expenditures by about 18 to 24

cents. This increase in the cost of government that accompanies higher density is not trivial. For example, Dallas has a population density of 3,075 people per square mile. If one wanted to approximately double the population density of Dallas to that of Seattle's 6,257 people per square mile, this would require an increase in density of about 2,800 people per square mile, and increase the cost of government by about $672 per resident per year. Not only is high-density development more costly to build, it is more costly to govern once it is built.

High-density development has many disadvantages. It concentrates pollutants where people are, it is more congested, it offers people less open space, it is more expensive to build, and the cost of government rises substantially with increasing population density. When land prices are high, high-density development makes sense to conserve on scarce land. Government policies to increase density make little sense, however. As noted earlier, there is plenty of land in the United States, so one does not need to be concerned about development consuming too much open space. Of course it makes sense to set aside land for parks, to preserve environmental amenities, and so forth, but it makes no sense to pursue government policies that try to increase development density. It lowers people's standards of living, and as the data in this section show, it costs more to build high-density development, and it costs more to govern. There is no reason to pursue policies that increase costs while decreasing people's well-being.

2. 20TH CENTURY POLICIES

Prior to the 20th century, land use was regulated primarily by the common law doctrine of nuisance, and zoning was introduced as a land use policy that could extend and codify the nuisance doctrine.[14] Zoning was introduced in New York in 1916 primarily as a way of keeping commercial districts from expanding into residential areas, and later refined as a way to separate apartments from single-family dwellings. The concept was so attractive that by the 1920s, zoning was rapidly spreading throughout the United States.[15] In a 1926 case, the U.S. Supreme Court ruled that zoning laws could separate apartments from single-family dwellings based explicitly on the nuisance doctrine.[16] Apartments were desirable in some locations, the Court found, but could constitute a nuisance in others. Originally, zoning was viewed as a regulatory method for keeping some types of land use from creating a nuisance to others. In the last half of the 20th century this concept of zoning was expanded into the broader idea that zoning laws, by mapping out land use patterns, can create more efficient patterns of land use. Thus, land use regulation evolved from trying to prevent nuisances and incompatible uses of land toward trying to design optimal land use patterns.

For most of the 20th century land use planning was almost exclusively the province of local government. In the last quarter of the century, states started becoming involved. Oregon has been a leader in this area and passed statewide growth management legislation in 1973, with Florida following in 1985. By 1999, twelve states had passed some type of growth management legislation, and

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[14] Were it not for expanding government regulation, the law of nuisance could play a more significant role in land use policy today. For a further discussion, see Randall G. Holcombe, *Public Policy and the Quality of Life* (Westport, CT: Greenwood Press, 1995), pp. 47-48 and 65-66.

[15] Richard Babcock, *The Zoning Game*, cited earlier, gives the history and proliferation of zoning ordinances in the United States.

[16] *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365 (1926).

another thirteen states were seriously discussing such legislation.[17] In these states, land use planning at the state level is an extension of local zoning. A land use map dictates how landowners may develop and use their property, with the idea of generating efficient patterns of development. Some problems with the underlying ideas were discussed in the previous section, suggesting that the resulting development patterns may not be as efficient as their proponents believe. While the planners undoubtedly have good intentions, an undeniable effect of such land use planning is that it restricts the freedom of property owners to use their property as they desire. Surely government land use planning should be undertaken not only with the narrow goal of improving land use, but also to further the fundamental American goal of protecting individual rights.

At the transition from the 20th to the 21st century, land use planning is practiced along the lines of central economic planning as it was done in the former Soviet Union. A state agency determines how individuals may use their resources, and while individuals and local governments have some say in the process, the state has ultimate say about whether the local governments' plans and the private property owners' desires are in compliance with the state plan. Similarly, in the former Soviet Union, plant managers used to draw up their own economic plans for their facilities, but the local plant's plans were subject to approval by the central planning bureaucracy, and all the local plans had to comply with the overall central economic plan. In states that have moved to statewide land use planning, the state land use bureaucracy also has the ultimate say. This parallel between American land use planning and Soviet economic planning is worth considering, not on ideological grounds, but on practical grounds. After all, many leading economists once argued that central economic planning like that in the Soviet Union was superior to the "unplanned" market system,[18] and those beliefs

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[17] Lincoln Institute of Land Policy, *Land Lines* 11, no. 4 (July 1999), p. 4-5.

[18] See, for example, Paul A. Samuelson, *Economics* (New York: McGraw-Hill, 1973), p. 883, where this Nobel laureate in economics explains in his best-selling college economics textbook that although the Soviet Union had only about 50 percent of the per capita income as the United States in 1973,

were common almost until the Soviet Union collapsed. Rather than denying the similarities, it is better to confront them head-on, so that American land use planning does not run into the same problems that ultimately caused the collapse of Soviet economic planning. Bluntly, we need to consider (1) whether there are good reasons to think that such central planning for land use can work more effectively than market planning, and (2) if so, how land use planning can avoid the problems that ultimately brought down central economic planning.

The critics of central economic planning emphasized that central planners can never be in a position to know as much about the optimal use of economic resources as the people who own those resources.[19] These same criticisms may also apply to 20th century land use planning. As it has become increasingly centralized, one can legitimately question whether planners in the state capital can plan efficiently for land use in a large number of local communities where community goals and sentiments may differ significantly from those of people in the planning bureaucracy. Even local governments can stifle creativity and innovation by restricting individuals' ability to develop their property as they desire. Certainly, one would want to prevent incompatible uses and would want to prevent the land use decisions of some from imposing costs on others. Legal mechanisms such as an increased reliance on the nuisance doctrine and the use of restrictive covenants are a way to do this without central land use planning. Furthermore, one should note that these goals of preventing incompatible uses of property and preventing external

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its superior economic system created more growth, so that the Soviet economy would catch up to the U.S. perhaps as early as 1990, and almost surely by 2010. At that time, the Soviet Union had existed for more than 50 years, but Samuelson did not foresee the economic problems that would cause it to disintegrate less than 20 years later. Quite the opposite, Samuelson believed the system of central planning was more efficient. Could ideas about the efficiency of centralized land use planning be wrong for similar reasons?

[19] See, for examples, Ludwig von Mises, *Socialism: An Economic and Sociological Analysis* (Indianapolis: Liberty Classics, 1981), and Friedrich Hayek, "The Use of Knowledge in Society," *American Economic Review* 35 (September 1945), pp. 519-530.

costs, which motivated land use planning at the beginning of the 20th century, entail the protection of individual rights rather than the restriction of rights.

As the 20th century progressed, land use planning became increasingly oriented toward the design of efficient land use patterns rather than the protection of property rights. Land use planning has accomplished this by restricting the ways in which individual landowners may use their property. But while governments have increasingly been planning the ways in which private property owners are allowed to use their property, governments have also come up short in planning for their own growth. In particular, inadequate planning for roads has produced innumerable situations where homes and businesses have had to be demolished to widen existing roads or put in new ones. This imposes more costs on private landowners, and building roads in this fashion is both more expensive and produces less efficient land use patterns than if the roads had been better planned further in advance. In short, 20th century land use planning has increasingly put government in charge of determining the use of private property but has not entailed adequate government planning for its own resources and infrastructure. Land use planning would be more efficient, and would do a better job of protecting individual rights, if these trends were reversed.

3. LAND USE POLICY FOR THE 21ST CENTURY

An examination of 20th century land use policy shows that some of its goals are of questionable value, and that even given its goals, the policies implemented were often counterproductive. After protecting specific environmental amenities from development, the main goal should be to encourage land uses in patterns that allow convenient and efficient access without producing conflicting uses. The best way to do that is through government planning of its own infrastructure, and especially roads, rather than through government planning of private land uses.

I. Transportation and Land Use

Throughout history, land use patterns have been determined by transportation corridors. For centuries, navigable waterways were the key transportation corridors, and major cities grew up around seaports and on navigable rivers. In the 19th century, railroads replaced waterways as the primary transportation corridors. Cities flourished at major rail intersections, and residential areas could be located further from employment locations, if they were convenient to passenger rail facilities. In the second half of the twentieth century, highways replaced railways as the major transportation corridors, and the widespread use of the automobile gave people unprecedented freedom to live where they wanted. Suburban living would not have been possible without the automobile to carry residents to and from the suburbs without having to rely on public transportation. Cities have existed for thousands of years, but widespread automobile travel is only half a century old. This rapid and significant change in transportation technology has caused a similarly rapid and significant change in land use patterns, and it makes sense to try to develop policies to respond to those changes.

In the context of land use planning, the earlier analysis showed that certain types of land uses naturally gravitate toward certain locations relative to the transportation infrastructure. This being the case, if one plans transportation corridors sufficiently in advance, efficient land use patterns will naturally emerge through market

forces, without the need for government planning. Through market incentives, residential and commercial areas naturally separate themselves so that they are conveniently located to each other but do not result in incompatible uses, if developers know ahead of time the location of major transportation corridors.

Incompatibilities arise when there is uncertainty about the future development of major transportation arteries. In that situation, formerly quiet residential roads turn into major thoroughfares, making what once was a desirable residential location turn into a desirable commercial location. Incompatibilities among types of land use arise, but they arise because of inadequate advance planning of transportation corridors. Understanding this, the solution is straightforward: Plan transportation corridors well in advance. Once these corridors are located, the invisible hand of the market will guide land owners toward efficient development patterns in much the same way as the invisible hand of the market has led to the efficient production of goods and services throughout the economy.

II. The Results of Ineffective Transportation Planning

The problems that arise from ineffective transportation planning are apparent in almost any developed area in the nation. As areas develop and automobile travel increases, roads are too narrow to handle the traffic flow. Major transportation thoroughfares are inadequate because when the areas were developed, they were on the periphery of the developed area, so they did not need to accommodate through traffic. Increased development, and development further out, then increases automobile traffic, causing traffic congestion. In hindsight, one can see that right-of-way should have been set aside not only to accommodate traffic local to the development, but also to create a corridor to allow access to any future development beyond the existing development. However, after increased congestion makes current roads inadequate, there are few good alternatives.

In order to widen existing thoroughfares, more right-of-way must be secured, which means buying up developed property. This is more costly than buying undeveloped property before the area is

built up, and creates undesirable development patterns because typically there is inadequate land to create access roads and visual buffers, and after widening, commercial establishments are often undesirably close to the right-of-way. Commuters must then drive by unsightly commercial areas that are too close to the roadway because the road was widened. In addition, through traffic must negotiate traffic that is entering and exiting business establishments along the right-of-way because no plans were made for access roads. This is the type of unplanned development that creates the undesirable characteristics associated with urban sprawl, but the fundamental problem lies not with the actions of private developers but with inadequate government planning for infrastructure – and especially roads – to service development.

Further problems arise when the existing thoroughfares are inadequate to handle through traffic. Unplanned development tends to produce infrastructure for its own use, but when built on the outskirts of the developed area, does not tend to leave transportation corridors for future through traffic. When development spreads out, there is the call for new roads through existing developed areas to accommodate through traffic. The NIMBY (not-in-my-backyard) effect arises when people who live in existing subdivisions oppose new major thoroughfares that will cut through their subdivision. One can hardly fault those residents for not wanting a major traffic corridor creating a nuisance for them. At this point there are no desirable options, however. Either a major thoroughfare is built, disrupting existing neighborhoods and costing a substantial amount for right-of-way because it must condemn already-developed property for its construction, or the thoroughfare is not built, leaving already-overburdened roads to carry more traffic, with more congestion and more delays. The problem arises not because of urban sprawl itself, nor with growth, nor with development, but because decades earlier there was inadequate planning for future transportation corridors.

Waiting until after traffic is congested to build transportation also precludes the creation of efficient land use patterns. If efficient land use patterns depend upon the location of transportation corridors, but major thoroughfares are not built until after an area is

developed, then it is not possible for developers (or government planners) to know where the optimal location may be for any type of development. If major shopping centers are best built near the intersections of major thoroughfares, then the best location for shopping centers cannot be known before the thoroughfares are located. In some instances, the thoroughfares will be built near the shopping centers after the fact; in other cases, thoroughfares could be located further away, which will lower the value of the shopping center and could even cause it to fail. Poor transportation planning can in this way contribute to vacant storefronts and urban blight as old commercial development is bypassed by new transportation corridors. Similarly, if residential subdivisions are best built away from major transportation corridors, a new thoroughfare carved through an existing neighborhood lowers the value of that neighborhood and can contribute to its decay.

One might be inclined to forgive past planners for not foreseeing the impact of the automobile on development, but now that its effects are apparent, the planning process in the 21st century should take account of those effects rather than continue with the same type of land use planning that has characterized the 20th century. Planning for private land use is not the solution to these problems. As this analysis has shown, private land use decisions will be made efficiently when transportation corridors are planned well in advance. Thus, the 21st century solution is to reorient the planning process away from government planning for private land use, toward government planning for its own future infrastructure development, and especially the development of transportation corridors.

III. Effective Transportation Planning

The key to effective planning of transportation corridors is to secure sufficient right-of-way well ahead of time and to make those corridors accessible to traffic. In the abstract, one might be concerned that too much land could be set aside for future transportation corridors. But in practice, one would be hard-pressed to find many examples of cases where governments, planning ahead, set aside too much land for roads, whereas examples abound of cases

where governments set aside an inadequate amount of land for transportation corridors. The first step is to plan where transportation corridors will be located. The optimal location will be a function of natural topographical features, current land use patterns, and plans that owners of undeveloped land might have. For example, a large tract of undeveloped land owned by a single owner might be a natural location for a shopping center, whereas if ownership is fragmented and some of the existing property is inhabited, a major commercial development might be less feasible. However, determining the location of efficient transportation corridors will not be as difficult as at first it seems, because optimal land use patterns are determined by the location of those corridors. Thus, simply designating the location of future transportation infrastructure by itself goes a long way toward generating efficient land use patterns. Land uses then conform to the planned transportation network.

To preclude later problems, land for the transportation corridors should be acquired as soon as the corridor is identified. This means that less developed property will have to be purchased for right of way – especially because commercial development will be attracted to the corridor – and also signifies a commitment to the corridor. Building a road in the right of way as soon as feasible is a good idea for two reasons. First, if the right of way is purchased and left as green space for a substantial amount of time, people near the right of way will start to think of the land as a kind of park, and will mount political opposition to actually constructing the road. Second, by building a road there immediately, it gives adjacent property owners access to their property and establishes a pattern of travel that will continue to evolve as the area develops. Thus, market forces can start to work to produce effective land use patterns. However, while building some road in the transportation corridor is advisable, there is no reason to build a major thoroughfare until the traffic warrants it.

From a practical standpoint, there are several ways to build a major thoroughfare incrementally with minimal disruption as the thoroughfare grows. One method is to secure the right of way for an eventual multi-lane limited access highway immediately, but initially build a two-lane road on one edge of the right of way, leaving the other side of the right of way undeveloped. Then, when traffic

volume picks up, a second two-lane road can be built on the other side of the right of way, creating a divided highway. The road can be widened in this way with minimal disruption to the existing flow of traffic. Another way is to plan for access roads to parallel a limited access highway, but initially only build the access roads, leaving most of the right of way between the access roads as green space. The access roads serve as the thoroughfare while traffic volume is light and allow for property owners to develop their land adjacent to the access roads. At this stage, ground level intersections with stop signs or traffic lights can be used. As traffic increases, a limited access highway can be built between the access roads, creating minimal disruption to existing traffic as it is being built, and bridges can be built to allow intersecting roads to pass over the highway once it is constructed.

This type of transportation planning requires significant advance planning and requires the right of way to be secured well ahead of the time when it will be fully used, but it does not require that the roads themselves be built in advance. If land use planning were done this way, having plans focus on government facilities and government-owned infrastructure, rather than on how private individuals can use their property, the resulting land use patterns would be much more efficient. To emphasize, effective land use planning for the 21st century can be implemented by planning transportation corridors well in advance, and securing rights-of-way once the locations of those corridors have been determined. Once these transportation corridors are located, private land use decisions will be led by an invisible hand to produce efficient land use patterns.

There is some similarity between this suggestion and the way that land use planning took place in the decades after World War II. One of the major tasks of planners was to design and locate roads. Back then, more money was spent on highway construction, as previously noted, and traffic problems were not so severe. When this transportation planning gave way to late 20th century planning methods, which tended to mandate how private landowners could develop their property but neglected government development of its own resources, traffic problems got worse, and inefficient land use

patterns were almost inevitable. Neither government nor private landowners can know what the optimal use of a parcel of land is until its relationship to the transportation infrastructure is determined. More planning for government infrastructure and less government mandates regarding private land use decisions will result in more efficient land use patterns and better growth management for the 21st century.

IV. Impediments to Effective Transportation Planning

Several factors can impede effective transportation planning. If planning has been inadequate in the past, there will be a backlog of roadway projects to relieve current pressing problems, making it more difficult to divert money toward buying right of way in areas that are not currently congested. As noted in Figure 2, highway spending in the United States has been falling as a percentage of income for decades, so funds are more scarce even as traffic has become heavier. However, one way to relieve traffic congestion in already-congested areas is to create new development with more adequate infrastructure – in other words, follow a strategy the opposite of urban infill. Urban infill creates more congestion in areas that are already the most congested, whereas new development has the potential to relieve some of that congestion, especially if the new development plans ahead for adequate infrastructure.

Political problems may be just as constraining as budgetary limitations. Some people oppose building roads because they believe that increased traffic congestion will force people to take mass transportation, or to use alternative modes of transportation such as bicycles, carpooling, and walking. The facts show that such approaches are likely to cause more harm than good.

Another source of political problems arises because wherever a new road is proposed, some people will always object. The reasons are often sound, especially if the road will impact the use of their property directly, but by obtaining right of way well ahead of when it is needed, these types of problems can be minimized. Yet from a political standpoint, when a road is proposed in an area not yet congested, the beneficiaries who will use the road in the future

cannot be specifically identified, and may not even live in the area yet. As a result, there is likely to be current political opposition to a policy that produces benefits well into the future. Elected officials have a limited incentive to pursue policies that generate political opposition now in exchange for future benefits that may not even be realized until they are out of office. Indeed, pursuing such a strategy may even hasten an elected official's departure from office. The result is that transportation planning tends to focus on correcting the negative effects of poor planning in the past rather than planning now to try to prevent similar problems in the future.

4. IS THERE A ROLE FOR THE FEDERAL GOVERNMENT?

This analysis concludes that effective land use planning for the 21st century means having government plan less how private landowners use their property, and do a better job of planning for their own resources, especially transportation corridors. This type of planning, by its nature, is best done at the local level for several reasons. First, preferences may differ across localities. Some people prefer higher-density urbanized areas while others prefer the suburbs. Thus, people tend to move to localities with amenities and development patterns they like, and local decision-making will be better able to take account of differences in local preferences than centralized decision-making.[20] Second, local decision-making is better able to take account of factors specific to local communities. Just by living in an area, local residents have an advantage in knowing local details that can make a difference in determining optimal land use patterns.[21] Third, local decision-making allows for more experimentation and innovation. With more ideas to choose from, ideas that work well can be imitated by other communities while those that do not can be discarded.[22] By planning locally, mistakes can be better contained, and better ideas can be developed through experience. At the beginning of the 21st century, the problems with centralized economic planning have been well recognized. Centralized land use planning has many of the same problems.

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[20] This idea, now well-developed by economists and political scientists, was originally put forward by Charles M. Tiebout, "A Pure Theory of Local Expenditures," *Journal of Political Economy* 64 (October 1956), pp. 416-424.

[21] See Friderich A. Hayek, "The Use of Knowledge in Society," *American Economic Review* 35 (1945), pp. 519-530, for an elaboration of this idea.

[22] See David Osborne, *Laboratories of Democracy* (Boston, MA: Harvard Business School Press, 1988) for a development of this concept.

Decentralized decision-making has many advantages. The crucial issues with regard to land use planning are local in nature, making local governments the natural level of government to undertake land use planning. Sometimes problems may spill over local government boundaries, so there may be a role for the state to play, particularly in coordinating the development of the transportation network.[23] However, because the issues are local and not national, and because there are advantages to making land use planning decisions at the local level, there is no justification for increasing federal government involvement in land use planning issues. The federal government already has a large impact on land use decisions, because it owns so much of the land area of the United States, because it is the creator of the interstate highway system, and because it regulates land use for environmental and other reasons. The problems related to urban sprawl, optimal land use and development patterns are primarily local in nature, however, and federal involvement in these issues would be counterproductive.

[23] Problems of potential spillovers between states can be solved by the states themselves better than by the federal government. For some insight as to why this is so, see Ronald Coase, "The Problem of Social Cost," *Journal of Law & Economics* 3 (October 1960), pp. 1-44.

5. CONCLUSION

The initiatives for "smart growth" and sustainable development at the end of the 20th century have been the result of unprecedented, rapid changes in land use patterns, brought on by the widespread adoption of the automobile. Ready availability of personal automobile transportation meant that people no longer had to live near mass transit, or within walking distance of frequent destinations. For the first time in history, suburban living became a practical alternative for most people, and Americans took advantage of the opportunity to own their own single-family detached homes with their own yards, away from the central city. The result has been an increase in low-density development and what has been characterized as urban sprawl. Sprawling development has brought with it many undesirable features, including increased traffic congestion and unsightly commercial development with massive amounts of land paved over for parking. In hindsight it is easy to see that in some cases, better decisions could have been made when land was being developed, but that is inevitable regardless of whether the development decisions were made by government or by private decision-makers.

Seeing the mistakes is easy, but it is harder to see why they were made, or how things might be improved in the future. One would expect, as a new form of development is rapidly taking shape, that some innovations would work better than others. Then people would try to remedy the problems in later development, imitating the most successful types of development and leaving behind those that are less successful. That has happened in both the public and private sectors. Developers have tried to make their creations more attractive through architectural innovations, and have tried to soften their impact on the surrounding environment through landscaping. Sometimes these changes are prompted by government regulation, but often they are a response to market incentives. To maintain their businesses, commercial developers have an incentive to make their creations inviting destinations, and residential developers have an incentive to make their creations more attractive living environments.

With regard to government land use policy, there are no direct feedback mechanisms as there are in the market, so mistakes are more likely to go unrecognized. As this analysis has shown, sometimes the negative effects of poor public policy are blamed on the market, and sometimes the negative effects of one counterproductive policy can lead to additional policies that are equally ill advised. The analogy to central economic planning in the former Soviet Union is apt, because right up until the collapse of the Soviet economy, some economic experts were saying that central economic planning was a better way to run the economy than the market. Bad policies may be hard to recognize when they are motivated by good intentions and aimed at real problems, but 20th century land use policy, now aimed at curing the ills of urban sprawl, has been built on the same general model as Soviet-style economic planning. Is there any reason to think that central planning of land use patterns will be more effective than central economic planning?

This analysis has shown that many of the issues that are a central part of the policy debate on "smart growth" are misconceived and irrelevant. Environmental preservation and the preservation of farmland have little to do with the issue of efficient patterns of real estate development, and the goal of creating higher-density development is inappropriate and counterproductive. Twentieth century land use planning has evolved from a mechanism designed to protect the property rights of landowners into a mechanism whereby the government centrally plans how private landowners are allowed to use their property, compromising property rights rather than protecting them, and producing inefficient results as well.

Efficient patterns of land use are determined by the location of transportation corridors. Without knowing the location of future transportation corridors, nobody in the private sector or the public sector can determine the best use for land in a particular location. There is a major role for government to play in land use planning, but it is not in determining how private landowners can use their property. It is in locating and designing future transportation corridors well before development takes place. Because of the challenges – including the political challenges – of advance planning in the design of transportation corridors, government land use

planning has taken the easy way out and dictated to private landowners how they may use their land. This type of planning treats the symptoms of inefficient planning, not the causes. Effective planning of transportation corridors would eliminate most of the real problems associated with urban sprawl.

Once the real issues are identified, and the key to addressing the issues is recognized as effective transportation planning, it becomes apparent that the issues in land use planning are mostly local, and that problems that spill over local boundaries can be addressed adequately by the states. There has been some discussion of the federal government becoming more actively involved in "smart growth" issues, but this analysis shows that there is no justification for federal involvement.

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This paper represents the work, views, and opinions of the author. Such opinions are solely those of the author, and do not necessarily represent those of the Joint Economic Committee, its Chairman, Vice Chairman, or its members.

APPENDIX

Appendix 1: Effects of Population and Commute Time on Public Transportation Market Share, 1990

Public transportation tends to be used more when it has a smaller time disadvantage compared to auto travel, and where the metropolitan population is larger.

	Dependent Variable			
	Public Market Share	**Public Market Share**	**Public Market Share**	**Auto/Public Transportation Commute Time**
Constant	13.17	-72.6	-50.2	69.3
	(-2.56)	*(-2.13)*	*(-1.47)*	*(-33.14)*
Auto/Pub Time		1.34	0.91	
		(-2.89)	*(-1.88)*	
Population	0.004		0.003	0.001
	(-2.97)		*(-1.97)*	*(-2.37)*
Adjusted R^2	***0.25***	***0.23***	***0.32***	***0.16***
		(t-stats are in parenthesis)		

Note: Public Market Share is the percentage of trips taken on public transportation; Auto/Public Transportation Commute Time is the single occupancy automobile commute time as a percentage of the public transportation commute time for central business district commuters. Population is the population (in thousands of people) of the metropolitan area. The data set includes the 25 metropolitan areas with the largest central business districts.

Interpretation of Regression Equations

For the first three regressions the dependent variable is the public transportation market share in the central business district, which is given in Table 7 for certain cities. The data set covers the 25 U.S. cities with the largest central business districts. Auto/Pub Time is the single occupancy automobile commuting time as a percentage of public transportation commuting time for central business district commuters, which is shown for selected cities in the far right column of Table 6. Population is the population of the metropolitan area. The first regression uses population as the only explanatory variable for public transportation market share, and the positive and significant result shows that higher population is associated with an increase in market share. The coefficient of 0.004 suggests that an increase of 100,000 in an area's population tends to increase the public transportation market share in the central business district by about 0.4 percent. The effect is not large, but noticeable and statistically significant.

The second regression uses only the single occupancy auto commute time as a percentage of the public transportation commute time as an explanatory variable, and it also is significant. The coefficient suggests that the higher the auto commute time is relative to public transit, the greater the public transportation market share. This makes sense in that commuters will be more inclined to use public transportation the less extra time it uses. The coefficient suggests that a one percent increase in auto transit time as a percentage of public transit will increase the public transit market share by about 1.34 percent. Table 6 shows that the average for the 25 cities in the data set it 73.6 percent, meaning that it takes only 73.6 percent as much time to commute by single occupancy auto as to commute by public transportation. If this number goes up by one percent (to 74.6), then that would increase public transportation's market share by 1.34 percent. The effect is statistically significant, and also is relatively large in the sense that if public transportation were slightly faster, its market share could increase noticeably.

The third regression uses both variables together to explain public transportation market share, and the results are not much

different than when each is regressed separately. The coefficients are slightly lower and the levels of significance are lower, but both t-statistics are close in magnitude, and both variables are significant at well above the 10 percent level. The coefficient on Auto/Pub Time is now slightly below one, still suggesting that if automobile commuting became one percent slower relative to public transportation, public transportation's market share could increase by almost one percent. The final regression shows that there is a small but statistically significant relationship between the auto commute time as a percentage of public transport commute time and population. In other words, in higher population areas there is less of a time advantage to driving to work than taking public transportation.

Appendix 2: High-Density versus Low-Density Construction Cost Indexes

High density construction is much more expensive than low density construction.

——— *1000 Square Foot Apartment* ———	***Construction cost index***
Low Rise (1-3 Story) with Parking Lot Space	100
Mid Rise (4-7 Story) with Parking Lot Space	126
Mid Rise with Parking Garage Space	138
Mid Rise without Parking	125
High Rise (8-24 Story) with Parking Garage Space	157
High Rise without Parking	144
——— *200 Square Foot Office* ———	***Construction cost index***
Low Rise (1-4 Story) with Parking Lot Space	100
Mid Rise (5-10 Story) with Parking Lot Space	109
Mid Rise with Parking Garage Space	153
Mid Rise without Parking	105
High Rise (11-20 Story) with Parking Garage Space	177
High Rise without Parking	130

Note: Square foot costs from R.S. Means Company, *Means Building Cost Construction Data*, 52nd Annual Edition (Kingston, MA: 1993), tables 025 and 171. Indexes are estimated by the author. Square foot data includes pro rata public space as well as private space. For example, a 1000 square foot apartment may have 800 square feet of private space, plus 200 square feet of hallways, building entryways, and other common space. Similarly, a 200 square foot office may have 100 square feet of private space and 100 square feet of pro rata common space. Parking spaces are estimated to occupy 240 square feet, including spaces for lanes to enter and exit the spaces. Doing the calculations this way biases the calculation to lower the relative cost of high-density construction, because low-rise buildings may open directly to the outside and would require fewer indoor hallways for access, for example. Cost indexes are for construction only and do not include the cost of land.

Appendix 3: Effects of Population Density on the Cost of Government

As population density rises, the cost of government per person goes up substantially. Total population of a city does not have a statistically significant effect on the per person cost of government.

	Dependent Variable		
	Per Capita City General Expenditures		
Constant	870 *(2.16)*	1621 *(4.13)*	870 *(2.18)*
Population Density	0.18 *(3.50)*		0.24 *(3.39)*
Population		0.29 *(1.33)*	-0.31 *(1.22)*
Adjusted R^2	***0.29***	***0.03***	***0.31***
	(t-stats are in parenthesis)		

Note: Data are from the *Statistical Abstract of the United States*, 1998 ed., U.S. Department of Commerce. Sample is the 28 large cities for which expenditure data is given in Table 524. Expenditure data are for 1995. Population density is calculated as population divided by square miles of land area.

Interpretation of Regression Equations

The first column shows a simple regression of population density on per capita city general expenditures. Population density is measured in people per square mile and expenditures are in dollars, so the coefficient on population density indicates that an increase in density of one person per square mile increases per capita expenditures by about 18 cents. The t-statistic of 3.50 shows that this relationship is statistically significant at the one percent level, and the adjusted R^2 of 0.29 shows that 29 percent of the variation in per capita city expenditures is explained by population density alone. This might be because there are diseconomies of scale, so that greater populations raise the per capita cost and higher population densities go along with larger populations. To test this proposition, the next column regresses total population on per capita expenditures. The relationship is positive, but not statistically significant, suggesting that per capita expenditures are independent of population. The third column includes both population and population density. In this regression, the sign on population changes to become negative, indicating the possibility of economies of scale in government, although again the coefficient is not statistically significant. The coefficient on population density is slightly higher, at .24, indicating that an increase in density of one person per square mile will raise the per capita cost of city government by 24 cents.